

## Annexure A

### Response to Annexure E

The numbering reference used is the same as used in Annexure E

#### **Number 1**

a) Response by Dr Willie van Niekerk

Most of the over-range readings for H<sub>2</sub>S were in headspace of tanks. These values were not used in modelling because tanks are closed. The measurements all form part of better understanding of contaminant sources. With regard to flux chamber measurements, the only out-of range H<sub>2</sub>S readings were in a small area on the northern stone drain, where most of the measurements were low or zero. The other high H<sub>2</sub>S readings were on the southern slopes, also in a rather narrow line. Approximately 4 meters from the high readings all values were low or zero. In the Airshed reports higher concentrations than the out-of -range limits were applied to estimate an upper-bound estimate. In order to increase confidence in the results emission measurements are being repeated with a calibrated dilution instrument that dilutes flux chamber sweep air to put concentrations of H<sub>2</sub>S within the measurement range of the instruments.

It is incorrect to say that there were only four canister measurements. The report is clear on this.

b) Response by Dr Willie van Niekerk

The canister samples will not reflect identical ranges of compounds and concentrations. Samples were collected from different locations and at different times.

The suggestion of an arbitrary selection of data points is a misunderstanding. This should be clear from reading the data spreadsheet. Canisters were used to determine a comprehensive range of VOCs and odorous compounds.

This is clearly presented in the report.

c) Response by Dr Willie van Niekerk

Non-detects are also valid data points. It must be acknowledged that the largest part of the site did not show emissions of any significance.

It is mathematically incorrect to use the term "dilute". In a set of data points (which may include low values or even zeros) one can use either the median or the average. The impression is created that low values are incorrectly used to bring down the overall site emissions. This is not the case. One cannot use data selectively and ignore real measured data that are low or zero.

d) Response by Dr Lucian Burger

These emissions are not zero. See table below.

e) Response by Dr Lucian Burger

These emissions were not excluded, in fact they were all used to calculate emissions for Valley 1 as an area source

f) Response by Dr Lucian Burger

The emissions of benzene measured with the flux chambers on Valley 2 (excluding stone drains) reported no benzene. The measured levels at the stone drain samples were used as Stone Drain 1 emissions. No benzene was detected at Southern Slopes. WB 2, 7 and 32 are at Valley 1 and were used to populate the emissions for Valley 1.

Table 4-2: Average emission rates of VOCs from Shongweni Landfill Site

Compound	Emission Rates							
	Valley 2 Surface Fluxes and Trench Emissions	Leachate Treatment Plant Fugitive Emissions	Leachate Storage Tanks	Stone Drain 1 Fluxes	Southern Slopes Fluxes	Valley 2 Dam Leachate Tanks	Valley 2 Dam Fluxes	Valley 1 Whirly-Birds Expressed as an Area Flux
	[g/m <sup>2</sup> -s]	[g/s]	[g/s]	[g/m <sup>2</sup> -s]	[g/m <sup>2</sup> -s]	[g/s]	[g/m <sup>2</sup> -s]	[g/m <sup>2</sup> -s]
Vinyl chloride	1.93E-07	1.03E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-07
Trichloroethene	5.23E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Trichloroethene (TCE) #	0.00E+00	0.00E+00	0.00E+00	1.19E-05	0.00E+00	0.00E+00	0.00E+00	6.07E-09
Trichloroethene (TCE)	0.00E+00	8.76E-07	0.00E+00	0.00E+00	2.78E-08	0.00E+00	0.00E+00	0.00E+00
Toluene	5.39E-06	1.84E-03	7.98E-06	9.53E-05	3.09E-07	4.67E-05	0.00E+00	3.26E-06
Ethylbenzene #	0.00E+00	0.00E+00	0.00E+00	4.13E-05	0.00E+00	0.00E+00	0.00E+00	8.14E-06
Ethylbenzene	1.48E-06	2.31E-03	3.59E-06	8.38E-07	1.28E-07	1.46E-05	0.00E+00	0.00E+00
m/p-Xylene	4.35E-06	0.00E+00	5.51E-06	2.23E-06	4.26E-07	1.56E-05	0.00E+00	0.00E+00
m&p - Xylenes #	0.00E+00	0.00E+00	0.00E+00	9.23E-05	0.00E+00	0.00E+00	0.00E+00	1.00E-05
m&p - Xylenes	0.00E+00	3.62E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	3.06E-07	4.10E-06	2.33E-07	5.39E-07	1.29E-07	2.56E-07	0.00E+00	5.98E-08
o-Xylene	1.71E-06	5.18E-04	2.89E-06	1.88E-05	1.77E-07	9.08E-06	0.00E+00	2.64E-06
1,3,5-Trimethylbenzene	3.37E-07	4.92E-05	3.04E-07	2.54E-06	1.32E-08	1.41E-07	0.00E+00	1.40E-07
1,2,4-Trimethylbenzene	7.74E-07	6.14E-05	3.17E-07	2.92E-06	1.43E-08	2.52E-07	0.00E+00	0.00E+00
1,2,3-Trimethylbenzene	8.07E-07	0.00E+00	0.00E+00	0.00E+00	1.90E-07	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene (PCE)	0.00E+00	6.40E-06	3.59E-07	4.01E-06	3.66E-08	1.99E-07	0.00E+00	6.02E-09
Benzene	0.00E+00	1.04E-04	3.30E-07	1.24E-06	0.00E+00	2.14E-06	0.00E+00	2.68E-07

# - WB's at Valley 1

Or if I consolidate the compounds with more than one entry:

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Compound	Emission Rates							
	Valley 2 Surface Fluxes and Trench Emissions	Leachate Treatment Plant Fugitive Emissions	Leachate Storage Tanks	Stone Drain 1 Fluxes	Southern Slopes Fluxes	Valley 2 Dam Leachate Tanks	Valley 2 Dam Fluxes	Valley 1 Whirly-Birds Expressed as an Area Flux
	[g/m <sup>2</sup> -s]	[g/s]	[g/s]	[g/m <sup>2</sup> -s]	[g/m <sup>2</sup> -s]	[g/s]	[g/m <sup>2</sup> -s]	[g/m <sup>2</sup> -s]
Vinyl chloride	1.93E-07	1.03E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-07
Trichloroethene	5.23E-07	8.76E-07	0.00E+00	1.19E-05	2.78E-08	0.00E+00	0.00E+00	6.07E-09
Toluene	5.39E-06	1.84E-03	7.98E-06	9.53E-05	3.09E-07	4.67E-05	0.00E+00	3.26E-06
Ethylbenzene	1.48E-06	2.31E-03	3.59E-06	4.13E-05	1.28E-07	1.46E-05	0.00E+00	8.14E-06
m/p-Xylene	4.35E-06	0.00E+00	5.51E-06	2.23E-06	4.26E-07	1.56E-05	0.00E+00	0.00E+00
m&p - Xylenes	0.00E+00	3.62E-03	0.00E+00	9.23E-05	0.00E+00	0.00E+00	0.00E+00	1.00E-05
Styrene	3.06E-07	4.10E-06	2.33E-07	5.39E-07	1.29E-07	2.56E-07	0.00E+00	5.98E-08
o-Xylene	1.71E-06	5.18E-04	2.89E-06	1.88E-05	1.77E-07	9.08E-06	0.00E+00	2.64E-06
1,3,5-Trimethylbenzene	3.37E-07	4.92E-05	3.04E-07	2.54E-06	1.32E-08	1.41E-07	0.00E+00	1.40E-07
1,2,4-Trimethylbenzene	7.74E-07	6.14E-05	3.17E-07	2.92E-06	1.43E-08	2.52E-07	0.00E+00	0.00E+00
1,2,3-Trimethylbenzene	8.07E-07	0.00E+00	0.00E+00	0.00E+00	1.90E-07	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene (PCE)	0.00E+00	6.40E-06	3.59E-07	4.01E-06	3.66E-08	1.99E-07	0.00E+00	6.02E-09
Benzene	0.00E+00	1.04E-04	3.30E-07	1.24E-06	0.00E+00	2.14E-06	0.00E+00	2.68E-07

g) Response by Dr Willie van Niekerk

The symbols were carried over from worksheets and were reminders. There are no footnotes and the data sheets are complete.

**Number 2**

a) Response by Dr Willie van Niekerk

INFOTOX did not use the Scentinal readings in the health risk assessment. Their work was based on actual sampling directly from the various surface areas on site and the data was the provided to Airshed to populate the dispersion model to model what the ambient air quality would be to what the community will be exposed to. The real time monitors measures ambient air quality and the real time data was used only to verify the modeling data. With reference to the timelines, the real time monitors in the community were only installed in March 2017 and the final report had to be completed by 10 April 2017.

Response by Dr Lucian Burger

The measurements made at the three monitoring stations in the residential areas indicated that there were background concentration values which were associated with wind directions opposite that of the landfill. As a result, if this background is not included for these stations, there could be a large difference between measured and predicted concentrations when comparing lower percentiles.

In contrast, a comparison made at Valley 2 agreed within a factor of 2 even at low percentiles, confirming that all H<sub>2</sub>S at this location was from the landfill and predicted by the model. Recognising the preliminary nature of the measurements (i.e. representing only 10 days), the Airshed report provided estimated background concentrations for consideration in the health risk assessment.

- b) Airshed definitely did not disregard the INFOTOX data, they used the data to determine the levels of exposure for the community. When they compared the modelled data to the real time monitors they were in some instances double the measured results but they used Airshed's modelled data based on the INFOTOX results to do the HHRA.

Response by Dr Willie van Niekerk

The INFOTOX measurements were in the ppm (converted to mg/m<sup>3</sup> range), not µg/m<sup>3</sup>).

Response by Dr Lucian Burger

The highest single reading reported by Infotox based on a single canister result was about 6970 mg/m<sup>3</sup>, which is more than 1000-fold higher than the concentrations observed at the monitor near Valley 2.

- c) Response by Dr Willie van Niekerk

The report explains which data sets were used and why. The spreadsheets with monitoring data given to Airshed are clear. All measured data are in the spreadsheets and also in the field notes. INFOTOX did not select data that suited any particular objective.

It was never the intention to use the real time monitoring data to conduct the HHRA but only to validate the dispersion modelling. Both reports were based on data collected by INFOTOX during their field work conducted at the Shongweni landfill site.

- d) Response by Dr Lucian Burger

The presentation was of the polar plots that indicated concentrations as a function of wind direction. This was included since it represented a much longer measurement period than the period included in the Airshed Report. It was included in the presentation to illustrate the possibility of sources in other directions as well as the complexity of possible recirculation in the study area. This was discussed in the Airshed Report albeit based on the shorter monitoring period, and numerical measurements were in any event used to estimate a background or baseline concentration unaccounted for by the model, as discussed above.

- e) Response by Dr Willie van Niekerk

The word "continuous" is not used in the INFOTOX sampling report or health risk assessment. Sampling dates, times and locations are clearly presented in the documentation.

Flux chamber measurements are not continuous measurements. The best that can be done is to measure at specific locations over time. INFOTOX conducted such measurements over time at 2 locations. The variability was also apparent at particular locations where on one day high readings were registered, and on the next day at the same location zero. Also, there are locations where high readings were recorded, and just a few meters away, readings were low or even zero. For someone who wants to study this, all readings, locations and times are in the INFOTOX data.

The sampling done included the various odour sources identified on site and this gave Airshed a comprehensive overview of all the odour contributors and at what concentrations to the odours being emitted from the site.

Flux chamber measurements were conducted under equilibrium conditions following purging. H<sub>2</sub>S measurements are almost instantaneous and canisters have standard sampling times depending on the choice of orifice.

In the additional work being done by the experts this answer will be dealt with in further detail.

- f) This process is not a scientific engagement.

